

CLAIMS:

1. An expandable medical balloon having first unexpanded state, an expanded state and a second unexpanded state, said balloon having a torque in the first unexpanded state and having a torque in the second unexpanded state.
- 5 2. The medical balloon of claim 1 further in combination with a catheter assembly having an inner shaft having a proximal end and a distal end.
3. The medical balloon of claim 1 mounted on said inner shaft.
4. The medical balloon of claim 3 wherein said inner catheter shaft has a torque in said first unexpanded state of said medical balloon and a torque in said second unexpanded state of said medical balloon.
- 10 5. The medical balloon of claim 1 wherein the torque releases in said expanded state of said medical balloon.
6. The medical balloon of claim 5 wherein the torque remains in said inner catheter shaft during said expanded state of said medical balloon.
- 15 7. The medical balloon of claim 6 wherein said torque in said inner catheter shaft releases when said medical balloon is in said second unexpanded state.
8. The medical balloon of claim 1 in combination with a catheter assembly.
9. The medical balloon of claim 8 further in combination with a stent.
10. The medical balloon of claim 2, said catheter assembly further comprises an outer shaft having a proximal end and a distal end.
- 20 11. The medical balloon of claim 10, said inner shaft is tacked to said outer shaft at said proximal end of said outer shaft.
12. The medical balloon of claim 1, said medical balloon rotated about the y-axis at an angle of about 30° from the y-axis or less in said first unexpanded state.
- 25 13. The medical balloon of claim 1, said medical balloon rotated about the y-axis at an angle of about 30° to about 90° from the y-axis in said first unexpanded state.
14. The medical balloon of claim 1, said medical balloon is rotated at an angle of about 30° to about 360° from the y-axis in said first unexpanded state.
15. The medical balloon of claim 1, said medical balloon comprising at least one member selected from the group consisting of thermoplastic polymers, thermosetting polymers or mixtures thereof.
- 30 16. The medical balloon of claim 1, said medical balloon comprising at least one material selected from the group consisting of elastomeric polymers, non-elastomeric polymers and mixtures thereof.

17. The medical balloon of claim 1, said medical balloon comprising at least one member comprises at least one material which is a thermoplastic block copolymer.

18. The medical balloon of claim 1, said medical balloon comprising at least one polymer selected from the group consisting of polyolefins, polyesters, polyethers, 5 polyamides, polyimides, polyphenylene sulfides, polyphenylene oxides, polyurethanes, polycarbonates, silicones, styrenic polymers, copolymers thereof, and mixtures thereof.

19. The medical balloon of claim 1, said medical balloon in a folded configuration.

20. The medical balloon of claim 19, said medical balloon in a folded configuration having two or more wings.

10 21. The medical balloon of claim 1, said medical balloon in a folded configuration having three or more wings.

22. A balloon catheter having an expandable member formed according to a method comprising the steps of:

15 a) providing an inner shaft having a distal end and a proximal end;

b) providing a balloon member having a distal end and a proximal end;

c) mounting said balloon member on said inner shaft; and

d) applying a torque to the inner shaft such that a torque is applied to said balloon member.

23. The balloon catheter formed according to the method of claim 22, said balloon 20 member having a first unexpanded state, an expanded state and a second unexpanded state, said balloon member having a torque in said first unexpanded state and having a torque in said second unexpanded state.

24. The balloon catheter formed according to the method of claim 23, said torque releasing during said expanded state of said balloon member.

25 25. The balloon catheter of claim 24 wherein the torque applied to said inner shaft remains in said expanded state of said balloon member.

26. The balloon catheter of claim 25 wherein the torque applied to said inner shaft releases when said balloon is in said second unexpanded state.

27. The balloon catheter formed according to the method of claim 22, the method 30 further comprising the step of forming said balloon member.

28. The balloon catheter formed according to the method of claim 22, the method further comprising the step of providing an outer shaft.

29. The balloon catheter formed according to the method of claim 22, the method further comprising the step of securing the balloon at its distal end to the distal end of the inner shaft.

30. The balloon catheter formed according to the method of claim 29, the method
5 further comprising the step of tacking the distal outer shaft to the inner shaft.

31. The balloon catheter formed according to the method of claim 22, the method further comprising the step of folding the balloon prior to applying said torque.

32. The balloon catheter formed according to the method of claim 31 wherein after folding, said balloon member has 3 or more wings.

10 33. A method of providing an expandable member of a balloon catheter with improved rewrap, the method comprising the steps of:

a) providing an inner shaft having a distal end and a proximal end;

b) providing a balloon member having a distal end and a proximal end;

15 c) mounting said balloon member on said inner shaft; and

d) applying a torque to said inner shaft resulting in application of a torque to said balloon member.

34. The method of claim 33 wherein said balloon member has a first unexpanded state, an expanded state and a second unexpanded state.

20 35. The method of claim 34 wherein said balloon having a torque in said first unexpanded state and having a torque in said second unexpanded state.

36. The method of claim 35 wherein said torque is released from said balloon member in said expanded state.

37. The method of claim 36 wherein said torque applied to said inner shaft remains when said balloon is in said expanded state.

25 38. The method of claim 37 wherein said torque applied to said inner shaft releases when said balloon is in said second unexpanded state.

39. The method of claim 33 further comprising the step of providing an outer shaft having a distal end and a proximal end.

30 40. The method of claim 33 further comprising the step of forming said balloon member.

41. The method of claim 33 further comprising the step of securing the balloon at its distal end to the distal inner shaft.

42. The method of claim 39 further comprising the step of tacking the distal outer to the inner shaft near the proximal end of said balloon.

43. The method of claim 33 further comprising the step of folding the balloon member prior to application of said torque.

5 44. The method of claim 43 wherein after folding, said balloon member has 2 or more wings.

45. The method of claim 43 wherein after folding, said balloon member has 3 or more wings.

10 46. The method of claim 33 wherein said balloon member is rotated about the y-axis at an angle of about 30° to about 360° from the y-axis in said first unexpanded state.

47. The method of claim 33 wherein said balloon member is rotated about the y-axis at an angle of about 30° to about 90° from the y-axis in said first unexpanded state.

48. The method of claim 33 wherein said balloon member is rotated about the y-axis at an angle of about 45° from the y-axis in said first unexpanded state.

15 49. The method of claim 33 wherein said balloon member comprises at least one member selected from the group consisting of thermoplastic block copolymers.

50. The method of claim 33 wherein said balloon member comprises at least one member selected from the group consisting of polyolefins, polyesters, polyethers, polyimides, polyamides, polyphenylene sulfides, polyphenylene oxides, polycarbonates, 20 silicones, styrenic polymers, copolymers thereof and mixtures thereof.

51. The method of claim 33 further comprising the step of disposing a stent about the balloon member.